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From the similar triangles PAB and PBD , we have $PB:DB=PA:AB$, or $PB:DB=h:a$. But $DB=\sqrt{(AD^2-AB^2)}=\sqrt{(4R^2-a^2)}$.

$$\therefore PB:\sqrt{(4R^2-a^2)}=h:a. \text{ Whence } PB=\frac{h\sqrt{(4R^2-a^2)}}{a}.$$

$$\therefore \frac{h^2(4R^2-a^2)}{a^2}=h(h+2R).$$

$$\therefore h=\frac{2Ra^2}{4R^2-2a^2}=\frac{Ra^2}{2R^2-a^2}=5.0062 \text{ miles.}$$

Also solved by G. B. M. ZERR, L. C. WALKER, H. C. WHITAKER, and J. SCHEFFER.

CALCULUS.

127. Proposed by J. A. CALDERHEAD, B.Sc., Professor of Mathematics, Curry University, Pittsburg, Pa.

Find the moment of inertia of a parallelogram about an axis perpendicular to its plane and passing through the intersection of its diagonals.

Solution by G. B. M. ZERR, A.M., Ph. D., The Temple College, Philadelphia, Pa.; J. SCHEFFER, A. M., Hagerstown, Md., and J. M. ARNOLD, Crompton, R. I.

Let the intersection of the diagonals be the origin; straight lines through the origin parallel to the sides, the axes; a , b the sides.

Then the required moment of inertia is

$$I=\rho\sin\beta\int_{-\frac{1}{2}a}^{\frac{1}{2}a}\int_{-\frac{1}{2}b}^{\frac{1}{2}b}[(x+y\cos\beta)^2+y^2\sin^2\beta]dxdy$$

where β is the acute angle of the parallelogram.

$$\therefore I=\rho\sin\beta\int_{-\frac{1}{2}a}^{\frac{1}{2}a}(bx^2+\frac{1}{2}b^2)dx=\frac{1}{2}\rho abs\sin\beta(a^2+b^2)=\frac{1}{2}m(a^2+b^2).$$

Also solved by W. J. GREENSTREET and L. C. WALKER.

128. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

The differential equation of a curve is $\frac{d^3y}{dx^3}+y=0$. Find its equation, there being the additional conditions that for $x=0$, $y=1$, that the tangent at the point $(0, 1)$ makes an angle of 45° with the axes, and finally that that point is a point of inflexion.

Solution by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, O.; and L. C. WALKER, A. M., Professor of Mathematics, Petaluma High School, Petaluma, Cal.

Using D for the operator d/dx , the given equation is

$$(D^3+1)y=0\dots\dots(1), \text{ or } (D^2-D+1)(D+1)y=0\dots\dots(2).$$